

which is $6\frac{1}{2}^{\circ}$ above the freezing point. That other circumstances must be combined with the cold to produce frost, is evident from this also; on the higher parts of mountains, where it is absolutely colder than in the plains on which they stand, frosts do not appear so early by a considerable space of time in autumn and go off sooner in the spring than in the plains. I have known frosts so severe as to kill the hickory trees round about Monticello, and yet not injure the tender fruit blossoms then in bloom on the top and higher parts of the mountain, and in the course of forty years, during which it has been settled, there have been but two instances of a general loss of fruit on it, while in the circumjacent country the fruit has escaped but twice in the last seven years. The plants of tobacco, which grow from the roots of those which have been cut off in the summer, are frequently green here at Christmas. This privilege against the frost is undoubtedly combined with the want of dew on the mountains. That the dew is very rare on their higher parts, I may say with certainty from twelve years observations having scarcely ever, during that time, seen an unequivocal proof of its existence on them at all during summer. Severe frosts in the depth of winter prove that the region of dews extends higher in that season than the tops of the mountains, but certainly, in the summer season, the vapors by the time they attain that height are become so attenuated as not to subside, and form a dew when the sun retires.

One more extract from the Notes on the State of Virginia showing Jefferson's close observation of the optical phenom-

non known as "looming," which is frequent at sea but rare on land; but as Jefferson says:

At Monticello it is familiar. There is a solitary mountain about 40 miles off in the south, whose natural shape, as presented to view there, is a regular cone, but by the effect of looming it sometimes subsides almost totally in the horizon, sometimes it rises more acute and more elevated, sometimes it is hemispherical, and sometimes its sides are perpendicular, its top flat and as broad as its base. In short, it assumes at times the most whimsical shapes, and all these perhaps successively in the same morning. The Blue Ridge of mountains comes into view in the northeast at about 100 miles distance, and approaching in a direct line passes by within 20 miles and goes off to the southwest. This phenomenon begins to show itself on these mountains at about 50 miles distance and continues beyond that as far as they are seen. I remark no particular state, either in the weight, moisture, or heat of the atmosphere, necessary to produce this. The only constant circumstances are its appearance in the morning only, and on objects at least 40 or 50 miles distant. In this latter circumstance, if not in both, it differs from the looming on the water. Refraction will not account for the metamorphosis. That only changes the proportions of the length and breadth, base and altitude, preserving the general outlines. Thus, it may make a circle appear elliptical, raise or depress a cone, but by none of its laws, as yet developed, will it make a circle appear a square, or a cone a sphere.

NOTES BY THE EDITOR.

METEOROLOGY IN THE PUBLIC SCHOOLS.

Among the improvements in methods of education none is more rational and practically successful than that which insists on requiring the pupils, from the youngest to the oldest, to observe natural phenomena and make their own personal records and deductions. For a century past the favorite field of "nature-study" has been that of botany, and a visitor to the best primary schools will find the children bringing in quantities of leaves, buds, and flowers, which they compare and study, and thus quicken their habits of observation and generalization. Almost equally attractive is the elementary study of the soils, rocks, and minerals. In regions where birds and insects are accessible these also afford fine objects for study. The whole tendency of modern pedagogy is to stimulate the study of nature in every field, especially those most easily accessible. In October, 1882, the present Editor had occasion to give a series of talks to the students of the Normal School in Washington, and to maintain that as we have the weather about us every day it constitutes an admirable subject for youthful observation and study. In accordance with the principles that were then taught at that Normal School it was necessary for each member of the class to record and analyze her own observations on the subject under consideration, in order, by this personal training, to obtain the experience that is necessary to successfully conduct the classes of children that must eventually come under her care. Accordingly, the present writer prepared an elementary printed form for the use of the class in which each member kept a personal diary of the weather, in so far as that could be done without instruments. Specimens of these diaries and an explanation of the whole system were exhibited at the New Orleans Exposition in December, 1884, in the division of pedagogy.

Subsequently the accomplished principal and founder of the Normal School at Washington (Miss Lucilla E. Smith) was called to take charge of a part of the work of the Training School for Teachers in Brooklyn, N. Y. In such a location where botany and geology are not so easily studied she again had occasion to advocate the observation and study of atmospheric phenomena as a means of training the perceptive faculties of the pupils. This idea, which was at first so novel, has been practically carried out during the past two years, and many have testified that not only the scholars but the teachers

themselves have profited greatly by this drill. Each child is expected to keep a record of the wind and weather, and the discussions that take place are rapidly disabusing the children's minds of erroneous ideas that are widely disseminated. The trite weather sayings that have been current for centuries, and that have no real basis of fact, yet are handed down like myths and legends *viva voce*, from parent to child, are now daily brought to the test of actual experience, and a healthy stimulus is given to the study of nature. The children, and even the teachers, begin to wonder at the numerous erroneous notions formerly entertained and to admire the clearer vision that they are now rapidly attaining. This feature in the study of nature was advocated before the Brooklyn Institute, in 1893, and the teaching of meteorology in the schools has since then received enthusiastic endorsement. Probably Miss Smith was the first in this country to introduce this study, first into the Normal School and then into the public schools of all the lower grades. The future development of meteorology in this country will largely depend upon the extent to which it is taught in the public schools. The special meteorologists of future generations will, undoubtedly, look back to the time when, as school children, their attention was first seriously directed to this study.

THE GENERAL CIRCULATION OF THE ATMOSPHERE.

On several occasions the Editor has in the MONTHLY WEATHER REVIEW enforced the principle that the important peculiarities of any season depend upon what is called the general circulation of the earth's atmosphere. That is to say, an unusual drought or a remarkable series of rains, or the so-called apparent secular change in the general climate of any locality is not at all to be considered as dependent, even to the slightest extent, upon the destruction of forests, the cultivation of the surface of the ground, the local evaporation, the presence of lakes or rivers, etc. Even great forest fires have been shown to have little influence on the subsequent weather. All these phenomena affect the air that is temporarily at the surface of the earth, but as soon as this air is raised and carried off into the cloud region, it is mixed with such a large mass of other air that its special influence becomes greatly diminished, and is felt, if at all, in some far distant region and at some distant time. It is very easily shown that the strong winds, and with them the temperature